Terrestrial Animal Health Standards Commission
Report - March 2008

GUIDELINES ON THE DETECTION, CONTROL AND PREVENTION OF *SALMONELLA* SPP. IN POULTRY

Article X.X.X.1.

Introduction

The aim of the *Code* is to assist Members in the management and control of significant animal diseases, including diseases with zoonotic potential, and in developing animal health measures applicable to trade in terrestrial animals and their products. These guidelines provide recommendations on the detection, control and prevention of *Salmonella* spp. in poultry.

In most food animal species, *Salmonella* spp. can establish a clinically inapparent infection of variable duration, which is significant as a potential zoonosis. Such animals may be important in relation to the spread of infection between flocks and as causes of human foodborne infection. In the latter case, this can occur when meat, eggs, or their products, enter the food chain thus producing contaminated food products.

Salmonellosis is one of the most common foodborne bacterial diseases in the world. It is estimated that over 90% of *Salmonella* infections in humans are foodborne with *Salmonella* Enteritidis and *Salmonella* Typhimurium accounting for a major part of the problem.

In the development and implementation of programs to achieve control of *S*. Enteritidis and *S*. Typhimurium, an improvement in flock status for other *Salmonella* serotypes can be expected.

Article X.X.X.2.

Purpose and scope

These guidelines deal with methods for on farm detection, control and prevention of *Salmonella* spp. in poultry. These guidelines complements the Codex Alimentarius Code of Hygienic Practice for Eggs and Egg Products (CAC/RCP 15-1976 Revision 2007). A pathogen reduction strategy at the farm level is seen as the first step in a continuum that will assist in producing eggs and meat that are safe to eat.

All hygiene and biosecurity procedures to be implemented in poultry flocks and hatcheries are described in Appendix 3.4.1. on Hygiene and Biosecurity Procedures in Poultry Production.

The scope covers breeding flocks, chickens and other domesticated birds used for the production of eggs and meat for human consumption. The recommendations presented in these guidelines are relevant to the control of all non-typhoid *Salmonella* spp. with special attention to *S*. Enteritidis and *S*. Typhimurium.

Article X.X.X.3.

Definitions (for this chapter only)

Broilers
birds of the species *Gallus gallus* selectively bred and reared for their meat rather than eggs.

Broken/leaker egg
means an egg showing breaks of both the shell and the membrane, resulting in the exposure of its contents.

Competitive exclusion
means the administration of defined or undefined bacterial flora to poultry to prevent gut colonisation by enteropathogens, including *Salmonella*.

Cracked egg
means an egg with a damaged shell, but with intact membrane.

Culling
means the depopulation of a flock before the end of its normal production period.

Dirty egg
means an egg with foreign matter on the shell surface, including egg yolk, manure or soil.

Layer or laying flock
means a flock of poultry during the period of laying eggs for human consumption.

Peak of lay
means the period of time in the laying cycle (normally expressed as age in weeks) when the production of the flock is highest.

Poultry
means members of the class Aves that are kept for the purpose of breeding or for the production of meat or eggs.

Pullet flock
means a flock of poultry prior to the period of laying eggs for human consumption or hatching.

Article X.X.X.4.

Surveillance of poultry flocks for *Salmonella* spp.

Where justified by risk assessment, surveillance should be performed to identify infected flocks in order to take measures that will reduce the prevalence in poultry and the risk of transmission of *Salmonella* spp. to humans. Microbiological testing is preferred to serological testing because of its higher sensitivity in broilers and higher specificity in breeders and layers. In the framework of regulatory programmes for the control of *Salmonella* spp., confirmatory testing may be appropriate to ensure that decisions are soundly based.

Results of surveillance will allow control measures to be implemented to reduce the risk of transmission of *Salmonella* spp. to humans:

a) In breeders control measures taken will prevent the transmission of *Salmonella* spp. to the next generation.

b) In layers control measures will reduce or eliminate *Salmonella* spp. contamination of eggs for human consumption.

c) In broilers this will permit measures to be taken at slaughter and further down the food chain (logistic slaughter and channelling).

Sampling

1. Available methods for sampling

Drag swabs: sampling is done by dragging swabs around the poultry building.

Boot swabs: sampling is done by walking around the poultry building with absorbent material placed over the footwear of the sampler.

Faecal samples: multiple samples of fresh faeces collected from different areas in the poultry building.

Meconium, dead in shell and culled chicks at the hatchery.

Additional sampling of equipment and surfaces may be performed to increase sensitivity.

2. Number of samples to be taken according to the chosen method

Recommendation is five pairs of boot swabs or 10 drag swabs. These swabs may be pooled into no less than two samples.

The total number of faecal samples to be taken on each occasion is shown in Table I and is based on the random statistical sample required to give a probability of 95% to detect at least one positive sample given that infection is present in the population at a level of 5% or greater.

Table I

Number of birds in the flock	Number of faecal samples to be taken on each occasion
25-29	20
30-39	25
40-49	30
50-59	35
60-89	40
90-199	50
200-499	55

500 or more	60

3. Laboratory methods

Refer to the *Terrestrial Manual*.

4. Time, frequency and type of samples to be tested

Time, frequency and type of sample for each poultry category listed below are based on risk assessment and production methods:

a) Breeders and hatcheries

i) Breeder pullet flock

- At the end of the first week of life.
- Within the four weeks before being moved to another house, or before going into production if the animals will remain in the same house for the production period.
- One or more times during the growing period if there is a culling policy in place. The frequency would be determined on commercial considerations.

ii) Breeding flocks in lay

- At least at monthly intervals during the laying period.
- The minimal frequency would be determined by the *Veterinary Services*.

iii) Hatcheries

- Testing in hatcheries complements on farm testing.
- The minimal frequency would be determined by the *Veterinary Services*.

b) Poultry for the production of eggs for human consumption

i) Layer pullet flocks

- At the end of the first week of life when the status of the breeding farm and the hatchery is not known or does not comply with these guidelines.
- Within the four weeks before being moved to another house, or before going into production if the animals will remain in the same house for the production period.
- One or more times during the growing period if there is a culling policy in place. The frequency would be determined on commercial considerations.

ii) *Layer or laying flocks*

- At expected *peak of lay* for each production cycle.
- One or more times if there is a culling policy in place or if eggs are diverted to processing for the inactivation of the pathogen. The minimal frequency would be determined by the *Veterinary Services*.

c) Broilers

i) Flocks should be sampled at least once. On farms where there is a long period (2 weeks or more) between thinning and final depopulation further testing should be considered.

ii) Flocks should be sampled as late as possible before the first birds are transported to the slaughter house. However, this must be done at a time that ensures the results are available before slaughter.

d) Empty building testing

i) Bacteriological monitoring of the efficacy of disinfection procedures is recommended when *Salmonella* spp. have been detected in the previous flock.

ii) Sampling of equipment and surfaces as well as boot swabs or drag swabs of the empty building after depopulation, cleaning and *disinfection*.

Article X.X.X.5.

Control measures

Salmonella control can be achieved by adopting Good Agricultural Practices and Hazard Analysis Critical Control Point (HACCP) in combination with the following measures. No single measure used alone will achieve effective *Salmonella* control.

Additional control measures currently available include: vaccination, *competitive exclusion*, flock culling and product diversion to processing.

Antimicrobials should not be used to control *Salmonella* spp. in poultry for human consumption because the effectiveness of the therapy is limited; it has the potential to produce residues in meat and eggs and can contribute to the development of antimicrobial resistance. Antimicrobials may also reduce normal flora in the gut and increase the likelihood of colonisation with *Salmonella* spp. In special circumstances antimicrobials may be used to salvage animals with high genetic value.

1. Day old chicks used to stock a poultry house should be obtained from breeding flocks and hatcheries that are certified as free from at least *S*. Enteritidis and *S*. Typhimurium and have been monitored according to these guidelines.

2. *Layer or laying flocks or breeder flocks* should be stocked from pullet flocks that are certified as free from at least *S*. Enteritidis and *S*. Typhimurium and have been monitored according to these guidelines.

3. Feed may be contaminated with *Salmonella*. Therefore, it is recommended to monitor the *Salmonella* status of poultry feed, and if found positive take corrective measures. The use of

pelletised feeds or feeds subjected to other bactericidal treatment is recommended. Feed should be stored in clean closed containers to prevent access by wild birds and rodents. Spilled feed should be cleaned up immediately to remove attractants for wild birds and rodents.

4. *Competitive exclusion* can be used in day old chicks to reduce colonisation by *Salmonella* spp.

5. As far as vaccination is concerned, many vaccines are used against *Salmonella* infections caused by different serovars in various poultry species, including single or combined vaccines against *S*. Enteritidis and *S*. Typhimurium. Vaccines produced according to the *Terrestrial Manual* should be used.

   If live vaccines are used it is important that field and vaccine strains can easily be differentiated in the laboratory. If serology is used as the surveillance method, it may not be possible to distinguish between vaccination or infection with a field strain.

   Vaccination can be used as part of an overall *Salmonella* control programme. Vaccination should never be used as the sole control measure.

   When the status of the breeding farm and the hatchery from which the *pullet flock* originates is not known or does not comply with these guidelines, vaccination of *pullet flocks*, starting with day-old chicks, against *S*. Enteritidis or *S*. Enteritidis/*S*. Typhimurium should be considered.

   Vaccination should be considered when moving day-old chicks to a previously contaminated shed so as to minimize the risk of the birds contracting infection with *S*. Enteritidis and *S*. Typhimurium.

   When used, vaccination should be performed according to the instructions provided by the manufacturer and in accordance with the instructions of the *Veterinary Services*.

   Vaccination against *S*. Enteritidis can cause positive reaction in *Salmonella* Pullorum-Gallinarum serological tests and needs to be considered when implementing measures for these pathogens.

6. Depending on animal health, risk assessment, and public health policies, culling is an option to manage infected breeder and layer flocks. Infected flocks should be destroyed or slaughtered and processed in a manner that minimises human exposure to *Salmonella* spp.

   If poultry are not culled, eggs for human consumption should be diverted for processing for inactivation of *Salmonella* spp.

7. As far as the veterinary involvement is concerned, the responsible veterinarian should monitor the results of surveillance testing for *Salmonella* spp. This information should be available to the veterinarian before marketing in order to certify the flock for slaughter. This veterinarian should notify the *Veterinary Authority* if the presence of *Salmonella* spp. is confirmed.

Article X.X.X.6.

Prevention of Salmonella spread

If a *flock* is found infected with *Salmonella* spp. the following actions should be taken in addition to general measures detailed in the Appendix 3.4.1. on Hygiene and Biosecurity Procedures in Poultry Production:

1. Epidemiological investigations should be carried out to determine the origin of the infection as appropriate to the epidemiological situation.

2. Movement of broilers, culled poultry or layers at the end of the production cycle should only be allowed for slaughter or destruction. Special precautions should be taken in the transport, slaughter and processing of the birds, e.g. they could be sent to a separate slaughter house or processed at the end of a shift before cleaning and disinfection of the equipment.

3. Litter should not be reused. Poultry litter/faeces and other potentially contaminated farm waste should be disposed of in a safe manner to prevent the spread of infections with *Salmonella* spp. Particular care needs to be taken in regard to poultry litter/faeces used to fertilise plants intended for human consumption.

4. Before restocking bacteriological examination should be carried out as detailed in these guidelines.

Article X.X.X.7.

Special considerations for broiler flocks

1. The grow out phase of broiler production is short and therefore it is important to emphasize the *Salmonella* status of the source flock.

2. Broilers are susceptible to colonisation with *Salmonella* spp. because they are young and are grown at high stocking rates.

3. To reduce *Salmonella* spp. contamination in the abattoir it is helpful to reduce the amount of feed in the bird's gut at the time of slaughter. Feed transits the gut in about four hours therefore it is recommended to withdraw feed to the birds at an appropriate period before slaughter (8-10 hours).

4. Slaughter processing should be conducted in accordance with Appendix 3.10.1.